

NON-PUBLIC?: N
ACCESSION #: 8809290099
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Palo Verde Unit 1 PAGE: 1 OF 6

DOCKET NUMBER: 05000528

TITLE: Reactor Trip Due to High Pressurizer Pressure
EVENT DATE: 08/21/88 LER #: 88-021-00 REPORT DATE: 09/19/88

OPERATING MODE: 1 POWER LEVEL: 075

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Timothy D. Shriver, Compliance Engineer TELEPHONE: 602-393-2521

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: TJ COMPONENT: FS MANUFACTURER: M302
X AA ZT C490
X JI PCV C600

REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT: On August 21, 1988 at approximately 1125 MST, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 75 percent power when the reactor tripped due to High Pressurizer Pressure. At approximately 1124 MST on August 21, 1988 the Main Turbine tripped on low Stator Cooling Water flow signal. The cause of the turbine trip was the failure of a microswitch in the stator coolant flow trip circuit. The cause of the reactor trip was high pressurizer pressure due to Steam Bypass Control Valves (SBCV) 1001 and 1004 closing faster than expected and the malfunction of SBCV 1003. Other than the reactor trip, no manually or automatically initiated safety system responses were received and none were necessary. Immediate corrective action was to replace the microswitch. To prevent recurrence, troubleshooting and rework of the SBCVs has been performed.

End of Abstract

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DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On August 21, 1988, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 75 percent power and ascending to 100 percent power.

B. Report Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification:

An event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF)(JE) including the Reactor Protection System (RPS)(JC).

At approximately 1124 MST on August 21, 1988, the Main Turbine (TRB)(TA) tripped on a low Stator Cooling Water (TJ) flow signal. At approximately 1125 MST the reactor (RCT) (AC) tripped on High Pressurizer (PZR)(AB) Pressure.

A reactor trip is not an expected occurrence following a turbine trip because of designed non-safety load rejection features. When the Steam Bypass Control System (SBCV)(JI) is in the "remote-auto" position, the steam bypass control valves (PCV) (JI) can operate at a "quick-opening" rate, which allows for rapid steam bypass control valve (SBCV)(PCV)(V) position adjustments for large reductions in steam flow. The SBCV can also operate the steam bypass control valves at a modulation rate. This allows more gradual steam bypass control valve adjustments based upon a main steam pressure setpoint. The SBCV is not required for the safe shutdown of the plant.

Following the main turbine trip, SBCVs quick-opened as required with the exception of SBCV 1003. SBCVs then modulated closed in response to changing plant conditions. According to the Temporary Data Acquisition System (TDAS) plots, SBCV 1003 went to approximately 6.6 percent open for approximately 40 seconds and then closed. In addition, TDAS showed SBCVs 1001 and 1004 had closed faster than expected (i.e., 9 seconds versus 15-20 seconds). This resulted in valves 1001 and 1004 completely shutting before modulating open. This delayed the valves reopening and reduced heat removal capabilities. This lag in secondary heat removal caused the primary system pressure to again increase resulting in a reactor trip due to high pressurizer pressure.

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The standby Stator Cooling Water Pump (P)(TJ) was started in an attempt to assure adequate cooling and to attempt to clear the alarm (ALM)(IB) by increasing flow. The alarm remained locked in with both stator cooling water

pumps running and the standby pump was then secured. During the course of the transient, flow to the stator was not lost.

The control room staff demonstrated an appropriately high level of concern regarding the event. Communications were clear, concise and included repeat backs. The Control Room Supervisor (CRS)(utility, licensed) directed the operators (utility, licensed) to maintain their critical safety functions as the CRS performed an event diagnosis in accordance with the approved procedure 41EP-IZZ01 (Emergency Operations). The event was properly diagnosed as an uncomplicated reactor trip and the appropriate recovery procedure 41RO-IZZ01 (Reactor Trip) was performed. The plant was stabilized in Mode 3 (HOT STANDBY) at approximately 1200 MST on August 21, 1988.

Following the trip, Control Element Assembly Calculator (CEAC)(CPU) 2 indicated that Control Element Assembly (CEA)(AA) 5 was at 90 inches withdrawn. All Reed Switch Position Transmitter (RSPT) (AA) inputs, pulse counters (CTR)(AA), and CEAC 1 showed CEA 5 fully inserted. In addition the rod bottom light (IL)(AA) for CEA 5 was lit indicating that the CEA was fully inserted.

Prior to the event during the Unit I refueling outage in 1988, a needle valve modification was installed per an approved Site Modification. These needle valves were installed on the SBCV pneumatic actuator so that the valve opening and closing times can be regulated. Final adjustment and testing of the SBCVs must be performed while the Unit is at power. These retests and adjustments should only be performed when the Unit is at greater than 70 percent power. This is necessary to facilitate plant control and to minimize plant perturbations during the dynamic testing of the valves.

The appropriate retests of the modified valves were to have been performed when the Unit achieved greater than 70 percent power. The valve closing time would also have been adjusted during this retest. The Unit tripped before the plant could achieve the conditions that were required for the valve testing.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Not applicable - no structures, systems, or components were inoperable at the start of the event that contributed to the event.

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D. Cause of each component or system failure, if-known: During troubleshooting of the Stator cooling Low Flow trip, it was identified via X-ray that the internal contacts in a microswitch (FS) (TJ) were faulty. The cause of the faulty internal contacts is not known.

During troubleshooting and rework of SBCV 1003 the event could not be repeated. SBCV 1003 was isolated and the valve disassembled for inspection. There was no evidence of any binding found inside the valve. It is believed that the valve may have been binding due to tight packing. However, the definitive cause of the valve not fully opening cannot be determined.

The rapid closure of SBCVs 1001 and 1004 is under investigation. Originally, the initial adjustment of the needle valves was believed to have caused the SBCVs to rapidly close and the subsequent reactor trip. Further investigation indicates that excessive piston ring leakage in the valves may have forced the valves shut too quickly. If additional information is discovered that would significantly alter the reader's perception of the cause, then a supplement to this report will be issued.

The erroneous indication for CEA 5 being at approximately 90 inches withdrawn was caused by a faulty Reed Switch Position Transmitter (RPST)(AA). Two switches in the RSPT failed causing erroneous indication from CEAC 2.

E. Failure mode, mechanism, and effect of each failed component, if known:

The microswitch contacts failed closed causing a turbine trip. The contacts normally close when Stator Cooling Water flow is reduced below a preset trip setpoint. When the contacts failed closed it was as if a low flow condition existed and a signal was sent to trip the turbine. The logic is a I out of I for low Stator Coolant flow.

The SBCV's not functioning per design did not allow heat removal of sufficient quantity and resulted in high pressurizer pressure and a reactor. trip.

The two switches in the RPST failed giving a faster than normal voltage change to the CEAC. The CEAC calculates this voltage change as an erroneous signal and indicates the last "good" signal which was the CEA at 90 inches withdrawn. The faulty RSPT had no effect on this event.

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F. For failures of components with multiple functions, list of systems or secondary functions, that were also affected:

Not applicable - the failed components do not have multiple functions.

G. For failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no safety systems were rendered inoperable.

H. Method of discovery of each component or system failure or procedural error:

The turbine trip and alarms (ALM)(IB) associated with the low stator cooling flow were annunciated on the Main Control Board (MCBD). Subsequent troubleshooting identified the microswitch in the pressure switch to be faulty. An X-ray of the microswitch identified the faulty contacts.

The malfunctioning of the SBCVs was identified during a review of the TDAS plots during the post trip review process.

CEA 5 indication at 90 inches withdrawn was identified during the reactor trip event. Troubleshooting identified the faulty RSPT.

I. Cause of Event:

The cause of the turbine trip was faulty internal contacts in the microswitch that is part of the stator cooling flow pressure switch.

The cause of the reactor trip was an increase of Reactor Coolant System pressure to the trip setpoint. The increase in pressure was due to the faster than expected closing of SBCV 1001 and 1004 and the malfunction of SBCV 1003.

J. Safety System Response:

Other than the reactor trip, no manually or automatically initiated safety system responses were received and none were necessary.

K. Failed Component Information:

The microswitch was manufactured by Micro Switch, and the model number is BZ-R173-P4.

The SBCV's are manufactured by Control Components International, and the model number is M3A9-12-12BW-16BW-31NB31.

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The RSPT's are manufactured by Combustion Engineering, and the model number is R1000.II.

ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

As described above, the reactor tripped as designed and all safety responses necessary to place the plant in a stable condition worked properly. There were

no ESF actuations and none were required. Based on the above, this event had no impact on the health and safety of the public. The SBCS is not a safety system and is not required for the safe shutdown of the plant.

III. CORRECTIVE ACTIONS:

A. Immediate:

The stator cooling flow microswitch was replaced and tested satisfactorily. SBCV 1003 was disassembled for inspection and rebuilt with the wave spring modification. The valve was then exercised several times to accommodate the new packing. A functional test was then performed to check the quick open and modulation times. SBCV 1003 operated with all quick open and modulation times within the acceptance criteria of the procedure and has operated satisfactorily.

B. Action to Prevent Recurrence:

A root cause of failure investigation is still in progress for the Steam Bypass Control System. The preliminary investigation indicates that there may be excessive piston ring leakage in the valves which forces the valves shut too quickly. A temporary modification has been made to the pneumatic actuators of SBCV 1001 and SBCV 1004 that will allow the modulation times to be set. Engineering is working closely with the vendor to determine the appropriate corrective action. If additional information is discovered that would significantly alter the reader's perception of the cause or corrective actions, then a supplement to this report will be issued.

IV. PREVIOUS SIMILAR EVENTS:

A previous similar event was reported in Unit I LER 86-045-00.

ATTACHMENT 1 TO 8809290099 PAGE 1 OF 1

Arizona Nuclear Power Project
P.O.BOX52034 PHOENIX ARIZONA 85072-2034
192-00410-JGH/TDS/JEM
September 19, 1988

U. S. Nuclear Regulatory Commission
NRC Document Control Desk
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS) Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 88-021-00

File: 88-020-404

Attached please find Licensee Event Report (LER) No. 88-021-00 prepared and submitted pursuant to 10CFR 50.73. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office. If you have any questions, please contact T. D. Shriver, Compliance Manager at (602) 393-2521.

Very truly yours,

J.G. Haynes
Vice President
Nuclear Production
JGH/TDS/JEM/kj

Attachment

cc: D. B. Karner (all w/a)
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ACCESSION #: 8809290142
